REMARKS

The above-identified patent application has been amended and Applicants respectfully request that the claims, as amended, be reconsidered and again examined.

Claims 1-30 are pending in the application.

In this response, Applicants have amended claims 1, 9, 12-17, 19, 21 and 25-30 in order to more particularly point out and distinctly claim that which Applicants deems to be the invention. Applicants respectfully submit that the modifications to the claims are all supported by the originally filed application.

Applicants have also amended the specification on page 8, line 25, to replace the terms "beam path 60" with the terms --beam path 61--. Furthermore, Applicants have amended Fig. 2 to replace the term "60" with the term --61--, which is consistent with the above-described amendment to the specification. Accordingly, Applicants have submitted herewith a clean copy of Fig. 2 reflecting the above amendment and respectfully request that this clean copy of Fig. 2 be approved and substituted for the current Fig. 2 of the present application. No new matter has been added.

The Prior Art Rejections

The Examiner rejected claims 1, 2, 19, 29 and 30 under 35 U.S.C. § 103(a) as being as being unpatentable over Wang (U.S. Patent 4,005,935, hereinafter referred to as "Wang") in view of Anafi et al. (U.S. Patent 4,996,412, hereinafter referred to as "Anafi"). The Examiner stated:

> "Wang invents a system for focusing electromagnetic energy on a target comprising: (a) first means for providing a pilot beam of electromagnetic energy, as shown by laser unit 10 in Fig.1 (=laser beacon of claim 2) and recited in Col.2/ll.26-32;

(b) second means for receiving a wave front due to reflection of the pilot beam from the target, as shown in Fig.1 by element 32 (Brillouin mirror), as recited in Col.2/ll.38-41;

(d) fourth means (reflection from Brillouin mirror 32) for providing an output beam, as recited in Col.2/ll.42-48, which is predistorted (by the Brillouin mirror 32), to compensate for distortions and other phase and/or amplitude information in the received wave front, as specifically recited in Col.2/ll.48-53, whereby the output beam is focused at the target, as specifically recited in Col.2/ll.45-48-48."

On page 3, line 6-9 of the Official Office Action, the Examiner recognized that in Wang, the compensation for phase distortion in is performed passively, or automatically, by the Brillouin mirror 32, instead of in response to the data provided by (c) a third means for analyzing the received wave front from the target and providing data in response thereof, as recited in Applicant's claim 1.

However, the Examiner addresses this deficiency in Wang by further stating that:

"A third means for analyzing the received wave front from the target and providing data for compensating the phase distortion is *well known in the art* as *Adaptive Optics* (AO), whereby the wave front analysis is carried out by a wave front sensor WFS and the data is passed on to a deformable mirror that compensates the phase distortion by predistorting the output beam. Such a third means is, for example, rendered obvious by Anafi et al. (but also by many others as generally known in the art).

Anafi et al. disclose a system for wave front compensation as shown in Fig.1, comprising a first means (laser 10) for providing a pilot beam of electromagnetic energy (beam path 110-120-141-160), as recited in Col.2/ll.15-16 & 57-59; second means (optical elements 50, 40, 20, 25 and 30) for receiving a wave front due to reflection of the pilot beam from a target 60 (return beam path 161-140-121-126-131-37), as recited in Col.2/ll.56-65; third means, i.e., a wave front sensor 37 for analyzing the received wave front from the target (i.e., the beacon return beam path 161-140-121-126-131-37), as recited in Col.3/ll. 2-8, and further, for providing data in response thereto, as recited in Col.3/ll. 8-11 (i.e., to deformable mirror 40) for compensating the phase distortion in the beacon beam (path 161-140-121-126-131), and further, providing data to a (high power) output beam 140 & 160 by means of deformable mirror 40 that *predistorts* the (high power) output beam 140 &160 to compensate for distortions and

other phase and/or amplitude information in the received wave front, as recited in Col.3/ll. 8-1 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wang's by Anafi's system, i.e., using a wave front sensor (WFS) and a deformable mirror to compensate the phase distortion, since the latter is a modern version that is much more versatile than the passive system of Wang."

The Examiner apparently asserts that it would be possible to modify the system of Wang to include a wavefront sensor (WFS) of the type described in Anafi. The Examiner, however, fails to teach or explain how one might incorporate the WFS from Anafi into the system of Wang to arrive at Applicants' invention, as recited in at least each of claims 1, 19 and 30.

Although the Examiner explains in great detail the operation of Anafi, Applicants respectfully submit that the Examiner fails to set forth or explain the manner in which Wang could be modified by Anafi as required by statute to support a prima facie case of obviousness. The Examiner only generally states that Wang could be modified by incorporating the WFS of Anafi. The Examiner, however, fails to state which WFS of Anafi should be used or how it should be incorporated into Wang. In other words, Anafi discloses a beacon WFS (37) and a laser WFS (35), however, there appears to be no teaching, suggestion or motivation in the references, nor is there any explanation by the Examiner, as to which WFS of Anafi should be incorporated into Wang. Moreover, there is no explanation in either reference nor provided by the Examiner as to how Wang should be modified by the teaching of Anafi. Thus, the Examiner's rejection fails to support a prima facie case of obviousness for the presently claimed invention.

On page 6 of the Office Action, the Examiner expressly concedes that neither Wang nor Anafi provide any teaching as to why or how they should be combined. The Examiner also concedes that the suggestion to combine the references comes from the Examiner himself. (See Office Action, Page 6, First full Para.).

Although the Examiner appears to provide an opinion as to how to combine the references, which opinion does not appear to be disclosed taught nor suggested in the references, the fact remains that it is only the Examiner's opinion, who after reading Applicants' specification and claims provides any suggestion to combine the teachings of the two references. Since no other motivation for the combination suggested by the Examiner is provided, it appears that the motivation came after the Examiner read Applicants' specification and claims. Applicants respectfully remind the Examiner that it is not permissible to use hindsight or to use Applicants' specification or claims as a template to remedy the deficiencies of Wang using Anafi.

The Examiner asserts that the combination suggested by the Examiner " . . . does not have to be expressly stated in the prior arts [sic] . . ." and that " . . . in the present case the rationale is reasoned from knowledge generally available to one of ordinary skill in the art." (See Office Action, Page 6, First full Para.) (emphasis supplied).

Applicants have carefully reviewed the Office Action and cannot find any clear statement of the "rationale" referred to by the Examiner. However, in the second full paragraph on page 4 of the Office Action, the Examiner seems to imply that the rationale for using the WFS and deformable mirror of Anafi to modify the system of Wang is because Anafi " . . . is a modern version that is much more versatile than the passive system of Wang." (See Office Action, Page 4, Second full Para.).

As an initial matter, to the extent that the Examiner's above statement stands for the position that active systems are modern while passive systems are not, Applicants respectfully submit that this position is not correct. It is well known in the art that passive systems (as well as active systems) continue to be developed, improved and modernized. It is also well known that the decision of whether to use an active system rather than a passive system, or a combination thereof, in any particular application depends upon a variety of factors including cost, the overall system complexity, laser energy, peak power, pulse format, wavelength and polarization at various locations in the system architecture.

Even assuming arguendo that the statement made by the Examiner is correct, Applicants respectfully submit that this rationale merely explains why one would select the system of Anafi (i.e. an active system) over the system of Wang (i.e. a passive system). Stated differently, the Examiner's statement merely explains why one would select an active system rather than a passive system for a particular application. The Examiner's statement does not provide any reason why the Wang reference should be modified by the elements of Anafi.

Furthermore, Applicants have carefully reviewed the references and it is not at all clear to Applicants that Wang could be modified by incorporating the WFS (beacon (37) or laser (35)) of Anafi, as suggested by the Examiner to arrive at a working system.

Lastly, Applicants would like to point out that a rejection under §103 based upon a modification of the Wang reference that destroys the intent, purpose or function of the invention disclosed in the Wang reference is not proper and cannot properly form the basis of a prima facie obviousness rejection. In this case, Wang clearly and repeatedly states that an object of the invention is to provide a system having decreased system complexity, simplicity of implementation and lower cost. (e.g. see Wang, Col. 1 lines 33-52). These objects are met by a passive system which includes a Brillouin mirror. These objects are not met by an active system such as the system of Anafi and the object of the Wang system would in fact be destroyed by the combination suggested by the Examiner.

In view of the above, Applicants submit that the Examiner has not established a prima facie case of obviousness and thus Applicants respectfully request that the rejection under 35 U.S.C. §103 be withdrawn.

Nevertheless, assuming arguendo that it is proper to combine the Wang and Anafi references, Applicants submit that the results would still not show, teach or suggest Applicant's claimed invention, since the combination of Wang and Anafi would not show, teach or suggest at least "...means for analyzing the received electromagnetic field from the target to determine,

from the received electromagnetic field, information that is indicative of at least one of: the nature of the target, the functionality of the target, the purpose of the target, the operational state of the target and the threat of the target," as called for in claim 1.

Nor does the combination of Wang and Anafi describe or suggest "... means ... for providing a modulated output beam and wherein said fourth means is adapted to modulate the output beam by changing at least one of a phase characteristic, a frequency characteristic, an amplitude characteristic, a polarization characteristic and a carrier frequency wavelength characteristic and wherein the modulated output beam is predistorted to compensate for distortions, phase noise and amplitude noise in said received electromagnetic field," as also called for in claim 1.

In contrast, the Wang and Anafi systems appear to only related to propagation-path phase errors (e.g., atmospheric distortions), which occur between the target and the source. This is not surprising since the goal of both Wang and Anafi are typically to compensate for intervening path distortions and to track the position of the object. The Wang and Anafi systems neither describe nor suggest processing information provided from the target itself, which is included on a return signal, as called for in Applicants' claim 1. That is, the Wang and Anafi references deal solely with propagation path errors and neither reference describes nor suggests receiving or analyzing information that may be encoded by the target onto a beam reflected back from the target toward the system.

Applicants respectfully note that support for the above-described amendments to claim 1 can be found in the present specification at page 2, line 30 to page 3, line 1; Page 4, lines 12 to 13 and lines 20 to 22, page 6, lines 26-30; page 7, lines 15-19, Page 8, lines 14 to 16, Page 9, lines 12 to 19, Page 10, lines 9 to 13 and page 10, line 28 to page 11, line 13.

Applicants thus respectfully submit that claim 1 is patentably distinct over the cited references, whether considered individually or in combination.

Independent claims 19 and 30 include similar features as independent claim 1 and are believed to be patentable for at least similar reasons. Dependent claims 2 and 29 respectively depend directly from independent claim 1 and independent claim 19 and each include additional patentable features and are each respectfully believed to be patentably distinct for similar reasons as discussed above with respect to claim 1.

Claims 2 and 29 include the features of claims 1 and 19, respectfully, and thus are also patentably distinct over the cited references generally for the reasons discussed above in conjunction with claims 1 and 19.

For the foregoing reasons, Applicants respectfully request that the rejection of claims 1, 2, 19, 29 and 30 be reconsidered and withdrawn.

The Examiner rejected claims 4-5, 8-12, 18, 20-24 and 29 under 35 U.S.C. §103(a) as being unpatentable over Wang in view of Anafi.

Applicants respectfully submit that dependent claims 4-5, 8-12 and 18 depend directly or indirectly from independent claim 1 and thus are patentably distinct over the cited references generally for the reasons discussed above in conjunction with claim 1.

Claim 12 is further patentably distinct over the cited reference since the reference neither describes nor depends indirectly from independent claim 1, which is shown above to be patentable, and recites additional patentable features including *"wherein said first means corresponds to a beacon laser and said fourth means includes a second laser, different from the beacon laser, for illuminating said deformable mirror to provide said output beam,"* which is not shown, taught nor suggested in Wang nor Anafi, whether considered individually or in combination. Rather, Wang and Anafi each disclose a system that incorporates a single laser for providing an incident beam. Specifically, Wang discloses laser (10) for ultimately providing an incident beam to target (20) and Anafi discloses a single laser (10) for providing beams 110-120-141-160, which appears to be directed to the target 60. However, neither Wang nor Anafi

disclose, teach, nor suggest "...*said first means corresponds to a beacon laser and said fourth means includes a second laser, different from the beacon laser, for illuminating said deformable mirror to provide said output beam*," as called for in Applicant's dependent claim 12.

Similarly, dependent claims 20-24 and 29 depend directly or indirectly from independent claim 19 and thus are patentably distinct over the cited references generally for the reasons discussed above in conjunction with claim 19.

For the foregoing reasons, Applicants respectfully submit that the rejection of claims 4-5, 8-12, 18, 20-24 and 29 35 under U.S.C. §103(a) is overcome. Accordingly, Applicants respectfully request that this rejection be reconsidered and withdrawn.

The Examiner rejected claims 3 and 5-7 under 35 U.S.C. §103(a) as being unpatentable over Wang in view of Anafi and further in view of Livingston (U.S. Patent 5,973,309, hereinafter referred to as "Livingston") and Stappaerts (U.S. Patent 5,378,888, hereinafter referred to as "Stappaerts").

Dependent claims 3 and 5-7 depend indirectly from, and thus include the features of, independent claim 1. Thus claims 3 and 5-7 are patentably distinct over the combination suggested by the Examiner since the references neither describe nor suggest "...means for analyzing said received wavefront from said target to determine, from the received electromagnetic field, information that is indicative of at least one of: the nature of the target, the functionality of the target, the purpose of the target, the operational state of the target and the threat of the target..." as called for in claim 1.

Nor does the combination of Wang in view of Anafi and further in view of Livingston describe or suggest "... means ... for providing a modulated output beam and wherein said fourth means is adapted to modulate the output beam by changing at least one of a phase characteristic, a frequency characteristic, an amplitude characteristic, a polarization characteristic and a carrier frequency wavelength characteristic and wherein the modulated output beam is

predistorted to compensate for distortions, phase noise and amplitude noise in said received electromagnetic field," as also called for in claim 1.

For the foregoing reasons, Applicants respectfully submit that claims 3 and 5-7 are patentably distinct over the cited references. Accordingly, Applicants respectfully request that this rejection be reconsidered and withdrawn.

The Examiner rejected claims 13-17 and 25-28 under 35 U.S.C. §103(a) as being unpatentable over Wang in view of Anafi and further in view of Pepper (U.S. Patent 4,767,195, hereinafter referred to as "Pepper") and general knowledge in the art. The Examiner stated:

> "Wang as modified by Anafi et al. shows all the limitations of claims 13-17 and 25-29, as previously applied to the parent claims 12 and 24, except for the limitation of modulating the output beam and other claim limitations to be addressed below.
>
> Modulation of the output beam is desired in case the system is intended for jamming optical communications and confusing the navigational system of the target. As generally known in the art, optical communications to and from space satellites and navigational systems of ballistic missiles are carried out by modulated optical signals. While Pepper's reference is only one of the many conventional methods of modulating optical communication signals, there is an abundance of optical *phase* as well as *intensity* modulators up to 10 Gbps modulation frequencies available in the commercial market today.
>
> Claims 13-17 and 25-28 recite limitations regarding methods and instrumentation *conventionally* used for implementing these optical modulations. These conventional methods and instrumentation are also well known in the art. This Official Notice taken by the Examiner is here supported by a large number of references and prior arts, as disclosed by Pepper (USPAT 4,767,195), which is just one among many others."

Claims 13-17 each depend directly or indirectly from independent claim 1 and thus include the features of claim 1. Thus claims 13-17 are patentably distinct over the combination suggested by the Examiner since the addition of the Pepper reference and/or the general knowledge in the art does not remedy the deficiencies of the cited combination of Wang and

Anafi in that the Pepper reference and/or the general knowledge in the art do not show, teach or suggest at least "...means for analyzing said received electromagnetic field from said target to determine, from the received electromagnetic field, information that is indicative of at least one of: the nature of the target, the functionality of the target, the purpose of the target, the operational state of the target and the threat of the target..." as called for in claim 1.

Nor does the combination cited by the Examiner describe or suggest "... means ... for providing a modulated output beam and wherein said fourth means is adapted to modulate the output beam by changing at least one of a phase characteristic, a frequency characteristic, an amplitude characteristic, a polarization characteristic and a carrier frequency wavelength characteristic and wherein the modulated output beam is predistorted to compensate for distortions, phase noise and amplitude noise in said received electromagnetic field," as also called for in claim 1.

Similarly, claims 25-28 depend indirectly from independent claim 19 and thus include all of the features if claim 19. Thus, claims 25-28 are patentably distinct over the combination suggested by the Examiner since the addition of the Pepper reference and/or the general knowledge in the art does not remedy the deficiencies of the cited combination of Wang and Anafi in that the Pepper reference and/or the general knowledge in the art do not show, teach or suggest at least " ... first means for analyzing information included in a received electromagnetic field to determine, from the received electromagnetic field, information that is indicative of at least one of: the nature of the target, the functionality of the target, the purpose of the target, the operational state of the target and the threat of the target and for providing data in response thereto, said electromagnetic field being provided by star light and electromagnetic field distortions being due to the atmosphere and ... second means for receiving the data from said first means and for providing a modulated output beam in response to said data wherein said second means is adapted to modulate the output beam by changing at least one of a phase characteristic, a frequency characteristic, an amplitude characteristic, a polarization characteristic and a carrier frequency wavelength characteristic and wherein the modulated output beam is

predistorted to compensate for distortions, phase noise and amplitude noise is said received electromagnetic field," as called for in claim 19.

For the foregoing reasons, Applicants respectfully submit that claims 14-17 and 26-28 are patentably distinct over the cited references. Accordingly, Applicants respectfully request that this rejection be reconsidered and withdrawn.

The Assistant Commissioner is hereby authorized to charge payment of any additional fees associated with this communication or credit any overpayment to Deposit Account No. 500845.

Based on the above, Applicants respectfully request that the Examiner reconsider and withdraw all outstanding rejections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at (781) 401-9988, Ext. 26.

Respectfully submitted,

Dated: 8/25/03

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Attachments
Q:\rtn\154pus (- Pepper)\rtn-154pus Response to OA dated 5-23-03.doc

FIG. 1
PRIOR ART

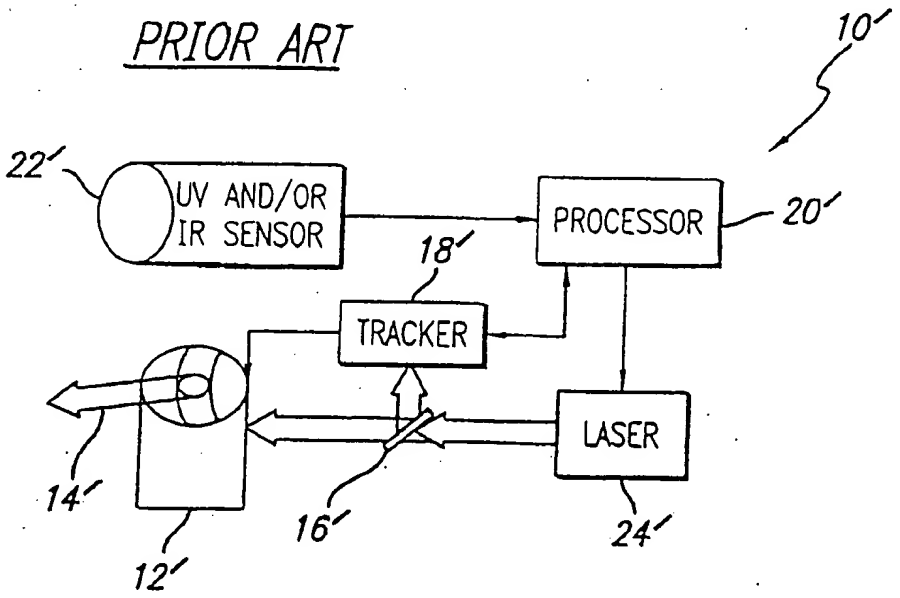

FIG. 2

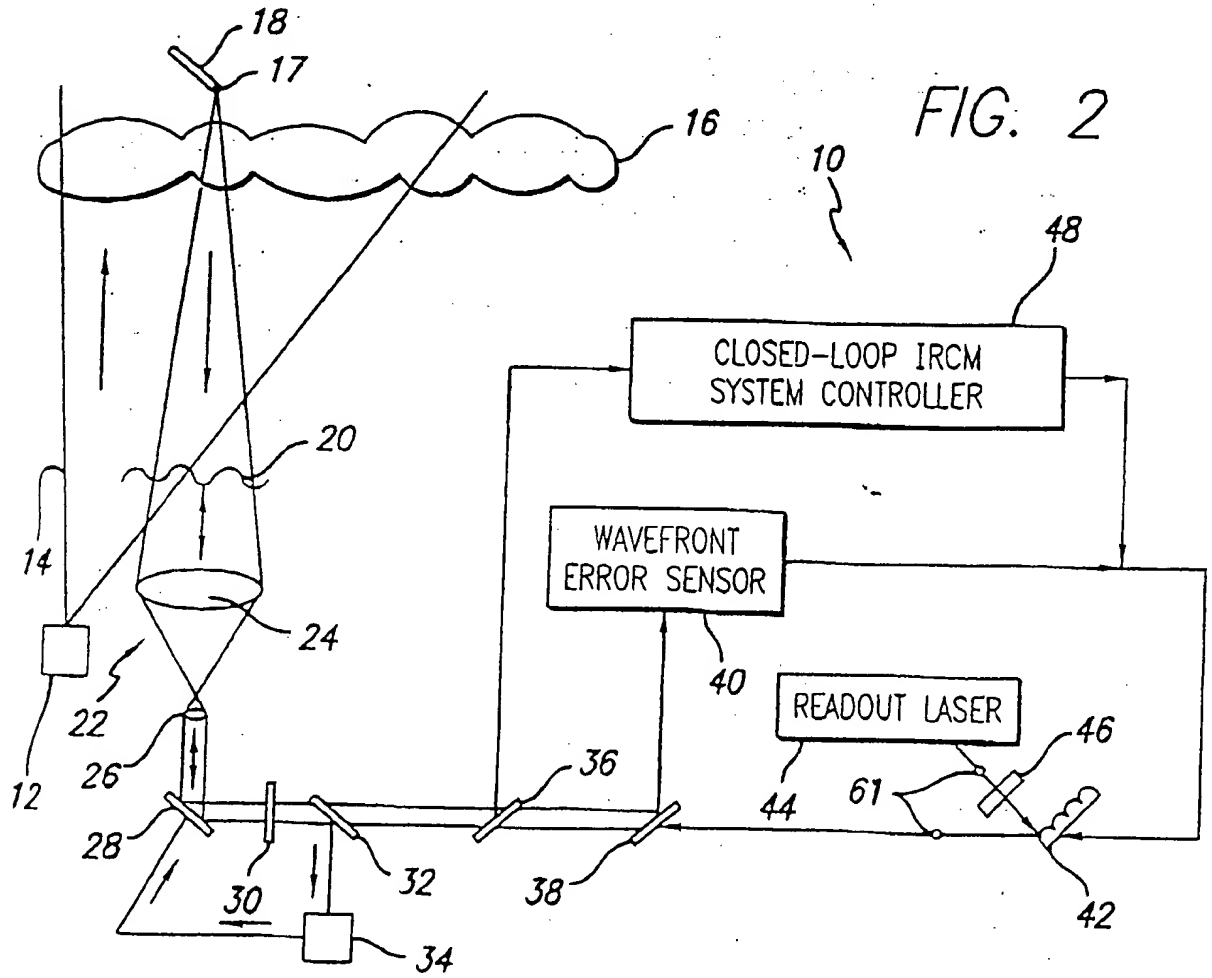

FIG. 1
PRIOR ART

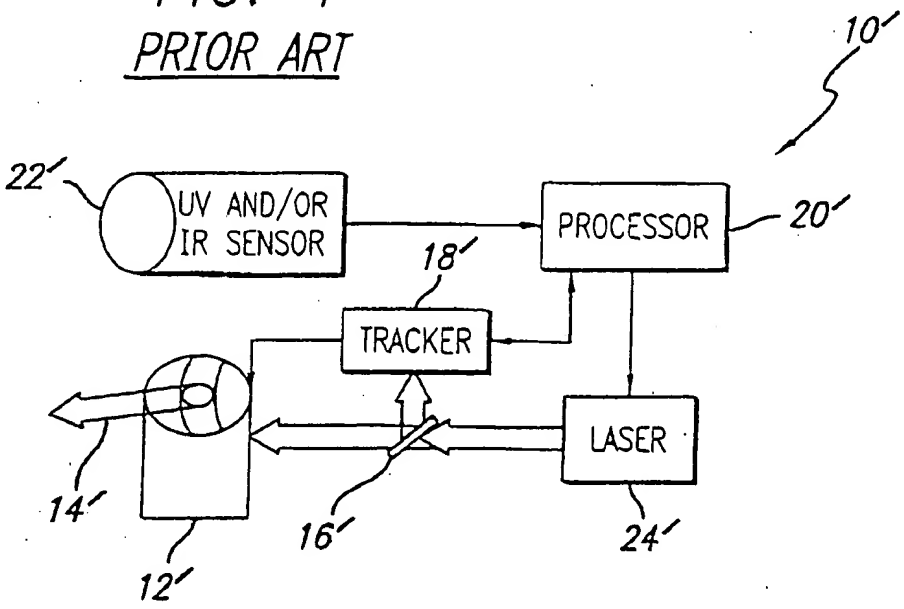

FIG. 2